

Station #2

Canada's astronauts

Marc Garneau



Marc Garneau. the first Canadian in space, is now a Liberal MP and the party's science, industry and technology critic. (Fred Chartrand/Canadian Press) **Years in space:** 1984, 1996, 2000

Hometown: Quebec City

Canada's first astronaut, Garneau was a member of the 1984 Challenger crew and performed a series of experiments, called CANEX, sponsored by the Canadian government.

Garneau returned to orbit in 1996 and 2000 on Endeavour, becoming the only Canadian to make three journeys to space. In 2000, he used the shuttle's Canadarm to install the first four solar panels on the International Space Station. In total, he logged 677 hours in space.

Garneau was president of the Canadian Space Agency from 2001 to 2005. In 2006, he ran unsuccessfully for federal office as a Liberal candidate in the rural Quebec riding of Vaudreuil-

Soulanges, but won in the downtown Montreal riding of Westmount-Ville-Marie in 2008. He is currently the Liberals' science, industry and technology critic.

Roberta Bondar

Canadian astronaut Roberta Bondar now keeps a busy schedule giving conferences on space and medicine. (Courtesy Roberta Bondar) **Year in space:** 1992

Hometown: Sault Ste. Marie, Ont.

Neurologist Bondar became Canada's first woman in space when she flew on the shuttle Discovery on Jan. 22, 1992. Bondar performed research into the effects of microgravity, lower body pressure and various pathological states on blood flow to the brain. She retired from the Canadian Space Agency later that year to continue her research while pursuing other ventures, including public speaking and photography. She served as chancellor of Trent University in Peterborough, Ont., from 2003 to 2009.



Steve MacLean



Canadian Space Agency astronaut Chris Hadfield pilots a tiny, one-person submarine in Pavilion Lake near Lillooet, B.C., in July 2010. Hadfield collected rock samples and took photos and videos of the unusual rock formations, called microbialites, deep beneath the lake's surface. (Pavilion Lake Research Project)

Chris Hadfield

Years in space: 1995, 2001

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Hometown: Born in Sarnia, Ont., raised in Milton,

Veteran test pilot Hadfield made his first shuttle flight aboard Atlantis, becoming the first and only Canadian to board the Russian space station Mir. Hadfield returned to space on April 20, 2001, to make history by becoming Canada's first astronaut to walk in space. His second spacewalk of that mission took seven hours and 40 minutes to make repairs to the space station. He also became the first Canadian to operate the Canadarm 2 in space. Hadfield later told CBC News that conducting a spacewalk was a grueling physical ordeal.

Robert Thirsk



Canadian astronaut Bob Thirsk waves as he rests inside a vehicle of the Russian Space Agency following his landing in December 2009 in northern Kazakhstan after six months in orbit. (Shamil Zhumatov/Associated Press)

Years in space: 1996, 2009

Hometown: New Westminster, B.C.

Thirsk flew as a payload specialist aboard space shuttle Columbia's Life and Microgravity Spacelab mission.

During the 17-day flight, he and six crewmates performed 43 experiments, some devoted to the study of changes in plants, animals and humans under space-flight conditions. Thirsk also trained as backup crewmember for a Russian Soyuz mission in 2005, the first Canadian astronaut to do so.

Thirsk became the first Canadian to complete a long-term stay in space when he lived aboard the International Space Station for six months in 2009. During his stay, Thirsk welcomed two other Canadians to the station, fellow astronaut Julie Payette and space tourist Guy Laliberté. The meeting of Thirsk and Payette on the ISS in July was the first time two Canadians met in space.

Thirsk has also used the station's robotic arm, Canadarm 2, to assist in the station's construction. In September, he assisted in the arm's capture of a Japanese cargo vessel, the first-ever capture

of a free-flying spacecraft. He called "the first Canadian cosmic catch" the most exciting moment of his mission. Thirsk was also the first Canadian to launch and land aboard a Russian vessel.

Julie Payette

Years in space: 1999, 2009

Hometown: Montreal.

Canada's second woman in space flew on Discovery from May 27 to June 6, 1999, and orbited Earth 153 times over 10 days while aboard the shuttle and the International Space Station. Payette operated the robotic Canadarm while in orbit.

She worked as a capsule communicator at the Mission Control Center in Houston, helping co-ordinate communications between ground control and the astronauts in flight.

In July 2009, she became the first Canadian woman to return to space when she served as the flight engineer on the crew of the shuttle Endeavour during a mission to the space station.



Guy Laliberté



Guy Laliberté wears a red clown nose during a video conference from the International Space Station. (CBC)

Cirque du Soleil founder Guy Laliberté became Canada's first space tourist, and the first professional artist to fly in space, when he launched into space aboard a Russian rocket and boarded the International Space Station in October 2009.

Station #3

Canadian satellite set to keep an eye on Arctic

Last Updated: Friday, December 14, 2007 | 4:12 PM ET

Space and military officials hope a satellite launched on Friday and capable of spotting fishing vessels as small as a car will be the latest tool to protect Canada's Arctic.

A Russian Soyuz rocket carrying the Radarsat-2 arrives at the launch pad of the Baikonur Cosmodrome in Kazakhstan on Wednesday.

(Canadian Space Agency)

Radarsat-2, the second in a series of Canadian radar satellites, was launched aboard a Russian Soyuz rocket from the Baikonur Cosmodrome in Kazakhstan at 8:17 a.m. ET on Friday.

Once calibrated and tested in space, Radarsat-2 will orbit 800 kilometres above the Earth's surface and pass over the Canadian Arctic three times a day.



The satellite uses radar instead of optical instruments to get images from space, sending radio waves down to Earth and then capturing the signals that reflect back to create its images. The method allows it to see through clouds and poor weather, day or night.

Marko Adamovic, a systems engineer with the Canadian Space Agency's Radarsat-2 team, said the satellite's sensors are also equipped with an "ultra-fine beam mode," capable of resolution of up to 3 metres, or about the size of an automobile.

Keen sensors have military applications

The first Radarsat satellite, launched in 1995, provided image resolution of up to 10 metres, said Adamovic.

The difference in resolution will give the satellite a greater chance of spotting smaller objects like fishing boats, a feature Adamovic said could prove useful for search-and-rescue operations, oil-spill monitoring or protecting Arctic sovereignty.

"Now we will be able to perform routine surveillance of Canadian coasts and better protect our sovereignty, particularly Arctic sovereignty," said Adamovic.

The high-resolution mode will not only allow the satellite to detect ships, it also offers the potential for ship classification, according to the Canadian Space Agency.

Among the government agencies that will use Radarsat-2 is the Canadian Forces. Brig.-Gen. Chris Whitecross, who heads up the military's operations in the North, said she hopes the new satellite will be ready in time for an Arctic military exercise planned for August.

"We might be seeing here, at Joint Task Force North, the capability to use those satellite images even as soon as perhaps [Operation] Nanook '08," Whitecross said, referring to the August exercise that will test how the military and other government agencies respond to a scenario involving a cruise ship that has run aground in Arctic waters.

Environmental research planned

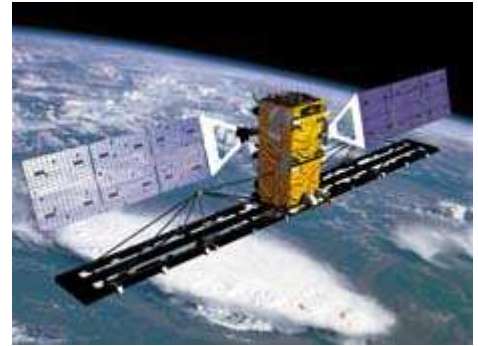
The Canadian Forces also hopes Radarsat-2 will help them monitor ship traffic in the Northwest Passage, Whitecross said.

The primary uses for the satellite, however, will be to monitor the environment and manage natural resources. Applications for the satellite include monitoring sea ice movement to allow ships to safely navigate waters, tracking water distribution, including wetland mapping, and mapping resources such as oil, minerals, forests, fisheries and agriculture.

An illustration of the Radarsat-2 satellite orbiting the Earth. The satellite is capable of providing images with a resolution of up to 3 metres. (Canadian Space Agency)

The data it collects on hydrology, geology and ice characteristics will also have numerous applications for climate change research, said Adamovic.

The project is a collaboration between the Canadian government and Canadarm maker MacDonald, Dettwiler and Associates Ltd. The government, through the CSA, contributed \$430 million to the project, while MDA added \$92 million and built the satellite.



Station #4

David Florida Laboratory

The David Florida Laboratory (DFL) has become Canada's national facility for spacecraft assembly, integration, and testing. It is a world class, full service, environmental test facility capable of qualifying the world's most advanced space systems.

The David Florida Laboratory aims to:

- provide ongoing support to meet the objectives of the Canadian Space Program through the qualification of flight hardware
- provide environmental and radio frequency testing at the system and subsystem level to a range of domestic and off-shore clients on space-based and terrestrial programs



Here's a brief list of the main projects that the DFL has taken part in since 1972.

DATE	EVENT	NOTES
2008 to 2009	James Webb Space Telescope	(JWST) This successor to the Hubble Space Telescope – JWST – is a joint mission by NASA, ESA, and the CSA. Canada is providing the Fine Guidance Sensor (FGS) which is integral to the telescope's attitude control system.
2001 to 2007	RADARSAT-2	Earth Observation Satellite Canada's next-generation Earth-observation satellite was launched in December 2007.
2003	MOST	Canada's astronomical space telescope that studies the Microvariability and Oscillation of Stars (MOST)
1995 to 2004	Mobile Servicing System (MSS)	The MSS is Canada's crucial contribution to the International Space Station and consists of the Special Purpose Dexterous Manipulator (Dextre), the Space Station Remote Manipulator (CANADARM2), and the Mobile Base System.
1992 to 1995	RADARSAT Earth Observation Satellite	Canada's first Earth-observation satellite.
1983 to 1986 1981 to 1982	ANIK D1 and D2	Communications Satellites First prime contract awarded to a Canadian company.
1972 to 1974	HERMES	Communications Satellite First satellite integrated and tested at the DFL. Joint Canadian-American effort to demonstrate direct-to-home broadcasting. Also known as the Communications Technology Satellite.

